Epitomes

Important Advances in Clinical Medicine

Ophthalmology

The Scientific Board of the California Medical Association presents the following inventory of items of progress in ophthalmology. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, research workers, or scholars to stay abreast of these items of progress in ophthalmology that have recently achieved a substantial degree of authoritative acceptance, whether in their own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Ophthalmology of the California Medical Association and the summaries were prepared under its direction.

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Evaluating Vision in Preverbal Children

CHILDHOOD VISION SCREENING has traditionally been done at ages 3 to 5 years, a time when children are finally old enough to tell us what they see. Disorders such as high or unilateral refractive errors, congenital cataracts, and strabismus often go undetected until a preschool vision check uncovers a long-standing loss of vision, or amblyopia. To prevent a permanent loss of vision, amblyopia must be diagnosed and treated early. The American Academy of Pediatrics and the American Academy of Ophthalmology recommend that, in addition to the newborn evaluation, all children have an eye examination by 6 months of age to evaluate visual fixation, ocular alignment, and the presence of eye disease. Children having questionable or unequal fixation responses would be referred for a more precise vision evaluation.

Although formal vision testing in infants and preverbal children has been difficult and often imprecise, the combination of clinical and research techniques currently available permits both early diagnosis and long-term monitoring of amblyopia and its response to therapy. The optokinetic nystagmus response, visual evoked response, preferential looking technique, and fixation pattern responses constitute the primary methods used at this time.

The optokinetic nystagmus response measures pursuit and saccadic movements. Controlling the size of black and white stripes provides an estimation of visual resolution acuity. The visual evoked potential basically records visual responses to stimuli such as checkerboard patterns and light flashes by measuring signals from scalp electrodes placed over the visual cortex. Preferential looking techniques are based on the fact that infants prefer looking at a spatial pattern, usually a grating of black and white stripes, rather than a homogeneous field. Visual acuity information is obtained by observing an infant's behavioral response to looking at grating versus nongrating stimuli as the size of the stripe is varied. Due to technologic, equipment, and personnel factors, the three techniques described are primarily research tools not readily available to most clinicians. The Teller acuity card, a modification of preferential looking developed to provide a rapid clinical technique for measuring infant vision, is now available to practitioners.

Fixation pattern evaluation is the technique used by most pediatric ophthalmologists to assess vision in preverbal children. A child views a target object—toy, picture, or cartoon—binocularly while the strength of the fixation in each eye is compared with the quality of fixation in the opposite eye. The child's general level of fixation is also compared with that expected for a visually normal child of the same age.

Visual acuity determinations can no longer be delayed until children reach preschool age. All children should have an initial vision screening by 6 months of age to detect ocular problems early. Those with possible vision loss should be referred for more complete visual assessment and treatment of amblyopia when present.

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Vision Loss in Pseudotumor Cerebri

BENIGN INTRACRANIAL HYPERTENSION (pseudotumor cerebri) is a misnomer; any disease that produces detectable vision or visual field loss in 49% of patients and severe vision loss (20/200 or less) in 6% to 24% cannot be considered benign. Increased intracranial pressure (pseudotumor cerebri) is a diagnosis of exclusion requiring showing the absence of a space-occupying lesion; a cerebrospinal fluid pressure greater than 200 mm of water, with the fluid chemically and cytologically normal; and normal results on a neurologic examination except for a sixth nerve palsy, vision loss, or a low frequency hearing loss.

Retrospective reviews of patients with pseudotumor cerebri have revealed risk factors for vision loss. Patients showing high-grade or atrophic papilledema, subretinal hemorrhage around the optic disc with or without subretinal neovascularization, a high degree of myopia, anemia, hypertension, and age older than 35 years are at an increased risk of vision loss. Neither the patient's weight, sex, cerebrospinal fluid pressure, nor symptoms of paresthesias, headaches, transient obscurations of vision, diplopia, tinnitus, nor the presence of optociliary shunt vessels are predictive of vision loss.

The primary treatment of pseudotumor cerebri is medical: withdrawal of any offending agents, such as oral contraceptives or tetracycline; weight loss; and the administration of diuretics, carbonic anhydrase inhibitors, and corticosteroids. Many patients are intolerant of or noncompliant with medical management, progressively lose vision, or have persistent headaches on maximally tolerated medical management. Lumbar-peritoneal shunting and optic nerve sheath decompression are surgical alternatives for such patients.

Lumbar-peritoneal shunting, which reduces the elevated cerebrospinal fluid pressure, is indicated for managing nonocular symptoms of pseudotumor cerebri such as headache. Complications of lumbar-peritoneal shunting include shunt failures, low pressure headaches, and pain. Technically, placing a lumbar-peritoneal shunt can be difficult in the typical patient who is obese.

Optic nerve sheath decompression is an effective means of preventing vision loss. Optic nerve sheath decompression requires exposing the optic nerve by a medial orbitotomy and cutting a window or slits in the dural sheath surrounding the optic nerve. Complications of optic nerve sheath decompression, while rare, include ischemic optic neuropathy, diplopia, infection, abnormalities in pupillary function, and orbital hemorrhage. Decompression of the optic nerve is intended to prevent deterioration of vision in the surgically treated eye; therefore, surgery on both eyes is required in many cases. An optic nerve sheath decompression is usually not effective in managing nonocular symptoms such as headache.

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Current Status of Refractive Surgical Techniques

REFRACTIVE SURGICAL TECHNIQUES are designed to improve the accuracy of the eye's focusing system in nearsighted, farsighted, or astigmatic eyes with the goal of eliminating or at least reducing the strength of glasses necessary to correct these conditions. Because the cornea is the eye's most powerful refractive surface—80% of the focusing of parallel light rays is accomplished by the cornea and 20% by the lens—most refractive surgical procedures attempt to modify the curvature of the cornea. The most frequently done refractive surgical techniques are radial and astigmatic keratotomy and epikeratoplasty.

By far the most common refractive surgical procedure is radial keratotomy, where fine microscopic corneal incisions are made in a radial pattern around a central clear zone. This results in corneal flattening, which reduces myopia. Most patients undergoing the procedure now receive 4 to 8 incisions instead of the 16 that were originally recommended.

When radical keratotomy is properly carried out on carefully selected patients, 80% to 90% of patients with low to moderate degrees of myopia can be corrected to 20/40 vision or better without spectacles (uncorrected). Patients with higher degrees of myopia can benefit from a significant reduction of their defect, but only 50% to 70% will achieve 20/40 uncorrected visual acuity. All studies have shown that older patients achieve more effect from radial keratotomy than do younger ones. Most patients who have had radial keratotomy do not achieve uncorrected 20/20 vision, and most of them continue to wear spectacles for activities such as driving.

Common undesirable side effects of radial keratotomy include glare, overcorrection and undercorrection, fluctuations in vision, and difficulties in fitting contact lenses after the operation. Serious complications leading to a permanent loss of vision have been reported but fortunately are rare. A substantial number of ophthalmologists regard radial keratotomy as being in the developmental stage and are not doing the procedure or recommending it. With more refinement, this technique may yield more precise results and few complications, thereby becoming more acceptable and adaptable for widespread use.

Astigmatic keratotomy to correct congenital, postcataract, and post-corneal transplant astigmatism has received increasing attention of late. The incisional patterns have become more standardized thanks to laboratory research, and early clinical reports are promising. The astigmatic corneal incisions are usually transverse and tangential ("T cuts"), rather than radial. Relaxing incisions and wedge restrictions are done in arcuate patterns and are used primarily for post-corneal transplant astigmatism.

In epikeratoplasty, a previously lathed superficial disc of human donor cornea is sutured over a patient's cornea, resulting in a new curvature that is either flatter, steeper, or smoother. Encouraging results have been reported in infants following the surgical excision of congenital cataracts, in children following the surgical excision of traumatic cataracts, in aphakic adults unsuitable for intraocular lens implantation, and in selected patients with keratoconus. The results in highly myopic patients have varied, and epikeratoplasty has not achieved the level of accuracy desired by most refractive surgeons. Considerable regression of the achieved effect has been reported in some patients. Epikeratoplasty for myopia is now being done by a small group of investigators who are refining the original procedure in an attempt to improve its accuracy and stability.

Radial and astigmatic keratotomy and the lathing of epikeratoplasty discs (and possibly even a patient's own cornea) can now be accomplished with potentially greater precision with the excimer laser, and laboratory investigations are currently under way in several centers in the United States and Europe. The possibility of improved accuracy with the excimer laser and the potential to modify corneal wound healing with new pharmacologic agents may improve the accuracy of refractive surgical techniques in the future.

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